

108050000-TD0011-R00

Spallation Neutron Source

CHL Glycol Cooling Controls

Functional System Design (FSD)

July, 2002



A U . S . D e p a r t m e n t o f E n e r g y M u l t i l a b o r a t o r y P r o j e c t

SPALLATION NEUTRON SOURCE

Argonne National Laboratory • Brookhaven National Laboratory • Lawrence Berkeley National Laboratory • Los Alamos National Laboratory • Oak Ridge National Laboratory

CHL Building RF Glycol Cooling Controls Description TD80011 Rev 0

Operating Philosophy

Purpose:

The purpose of RF Glycol cooling operation is to:

- a) Maintain the glycol at an appropriate temperature setpoint.

Assumptions: None

Operator Controls and Operating Modes

- 1) OFF: Pump is de-energized. Tower water return line control valve at 50% open.
- 2) ON: Pump is energized. Tower water return line control valve is modulated to control glycol supply temperature at setpoint selected by the operator.

OPERATOR INTERFACE DEFINITIONS

Local Hardware Displays/Operator Controls

- 1) Post heat exchanger glycol water pressure (*PI 5201A*)
- 2) Pre heat exchanger glycol water pressure (*PI 5201B*)
- 3) Post heat exchanger glycol water temperature (*TI 5201A*)
- 4) Pre heat exchanger glycol water temperature (*TI 5201B*)
- 5) Tower water supply pressure (*PI 5201C*)
- 6) Tower water return pressure (*PI 5201D*)
- 7) Tower water supply temperature (*TI 5201C*)
- 8) Tower water return temperature (*TI 5201D*)
- 9) HOA switch for Pump A (*HS 5201A*)
- 10) Pressure differential across pump (*PDIS 5201A*)
- 11) Glycol water pressure gauge isolation valves (*HV 5201A,B*)
- 12) Tower water pressure gauge isolation valves (*HV 5201C,D*)
- 13) Glycol water pump isolation valves (*HV 5201W, HV 5201X*)
- 14) Tower water return flow indicator (*FI 5201A*)
- 15) Pre heat exchanger glycol water flow (*FI 5201B*)
- 16) FAULT indicator light on MCC
- 17) READY indicator light on MCC
- 18) RUN indicator light on MCC

Software HMI/EPICS Digital Operator Controls

- 1) Pump Mode
 - a. OFF
 - b. ON

Software HMI/EPICS Digital Displays

- 1) Pump Mode switch status
 - a. OFF
 - b. ON
- 2) Pump energized or de-energized. (*PDIS 5201A*)

Software HMI/EPICS Analog Operator Controls

- 1) Glycol supply temperature

Software HMI/EPICS Analog Displays

- 1) Glycol water supply temperature (*TT 5201A*)
- 2) Tower water return line controller output (*IP 5201A/TCV 5201A*)

Software HMI/EPICS Alarms (via EPICS Alarm Handler)

- 1) Glycol supply temperature high and low
- 2) Low Flow due to Pump failure or massive leak (pump energized and differential pressure is low)
- 3) Flow path blocked (Pump energized and high differential pressure)

Control Logic Description

In the OFF mode, the pump is de-energized and the Tower Water Return Line Control Valve is set to 50 % open.

In the ON mode, the pump is energized and the Tower Water Return Line Control Valve is modulated by a PID algorithm to maintain the Glycol Supply Temperature Setpoint. After a delay period the differential pressure for the pump will be periodically checked for high or low flow. If either condition exists, the pump will be de-energized and the appropriate alarm returned to the operator.

